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Journal of the Society of Arts.

FRIDAY, DECEMBER 7, 1860.

INTERNATIONAL EXHIBITION OF 1862.

By the last mail from the Cape of Good Hope, the news has arrived that Cape Colony and Natal are preparing for the representation of the South African Colonies in the forthcoming International Exhibition of 1862.

Similar activity is being shown in other Colonies. The Committee of Correspondence of the Royal Agricultural and Commercial Society of British Guiana have issued an address, appealing

to those by whose exertions the Colony was so worthily represented at the Paris Exhibition in 1855, and to all others who take an interest in its prosperity, to endeavour in 1862 to bring its value and importance to the notice of European capitalists. The Committee contemplate holding a Local Exhibition at Georgetown, about the month of August, 1861, preparatory to the Great Exhibition.

It being thought advisable to form a collection of all printed documents and newspaper articles which have reference to the Exhibition of 1862, members and others will oblige by preserving such notices as they may meet with, and forwarding them to the Secretary of the Society of Arts, John-street, Adelphi, W.C.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made to the List of Guarantors and of the sums guaranteed since the announcement in the *Journal* for November 23 :—

* * * The name marked with an asterisk is that of a Member of the Society of Arts.

NAMES.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Amount last announced	£366,800	
*Joseph Bateman, LL.D., F.R.A.S., J.P., 24, Bedford-place, Kensington, W. ... 100		Arts.
George England, Hatcham Iron Works, one of the Directors of the Crystal Palace Company } 1,000		Manufactures.
Total £367,900		
BY ORDER,	P. LE NEVE FOSTER, <i>Secretary.</i>	

EXAMINATIONS, 1861.—NOTICE TO INSTITUTIONS AND LOCAL EDUCATIONAL BOARDS.

The attention of Secretaries of Institutions and Local Boards is specially called to Par. 5 of the Programme of Examinations for 1861, as follows :—

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1861. In some cases the Local Educational Boards comprise such large districts that for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

PRIZE FOR AN ESSAY ON MARINE ALGÆ.

A Prize of £100 has been placed at the disposal of the Council, by Sir W. C. Trevelyan, Bart., to be awarded for "The best Essay on the

Applications of the Marine Algae and their products, as food or medicine for man and domestic animals, or for dyeing and other manufacturing purposes. Competitors must give the results of their original investigations on seaweeds; and they must prepare a series of specimens illustrative of the best modes of collecting, preserving, and preparing the several species. Mere compilations will not be admitted to competition."

The Essays, with accompanying specimens, must be sent to the Society of Arts by the 31st day of December, 1860. Each Essay to be marked "Essay on Marine Algae," and to have a motto or distinctive mark attached, which mark must also be written on a sealed letter, containing the name and address of the author.

The letters containing the names and addresses of the authors will remain with the Society of Arts, and none will be opened except that bearing the motto or mark attached to the Essay to which the adjudicators award the Prize.

Copies of the conditions may be obtained on application to the Secretary of the Society of Arts.

THIRD ORDINARY MEETING.

WEDNESDAY, DECEMBER 5, 1860.

The third Ordinary Meeting of the One Hundred-and-Seventh Session was held on Wednesday, the 5th inst., George Cruikshank, Esq., in the chair.

The following gentlemen were proposed for election as Members of the Society:—

Andrews, W. P. 26, Montague-square, W.
Harrison, Archibald Stewart. { 133, Upper Thames-street,
E.C.
Heath, T. Vernon 43, Piccadilly, W.
Moate, C. R. 65, Old Broad-street, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Adams, John Hamilton, N.B.
Aldam, William, Frickley-hall, near Doncaster.
Alexander, Henry B. The Laurels, Barnes, S.W.
Artingstall, George Warrington.
Baldry, James Danford ... { 2, Queen's-square-pl., West-
minster, S.W.
Barnet, George 2, Leinster-gdns, Hyde-pk., W.
Bartholomew, C. Broxholme, Doncaster.
Begbie, Thos. Stirling.... 4, Mansion-house-place, E.C.
Boulton, Joseph 28, Baginigge-wells-road, W.C.
Bradbury, James Huddersfield.
Bragg, John..... { 18, Vittoria-st., Regent-place,
Birmingham, and 18, Tha-
vies-inn, E.C.
Bramston, William..... 11, Waterloo-place, S.W.
Bridgewater, John 41, Wood-street, E.C.
Campbell, Colin Minton... { 9, Albion-place, Blackfriars,
S., and Hartshill, Stoke-
upon-Trent.
Campbell, Hugh..... 4, St. Paul's-grove, Canonbury, N.
Caplin, Madame Anne } 58, Berners-street, W.
Chadwick, John 12A, Mosley-street, Manchester.
Charlton, Henry { 10, Great Charles-street, Bir-
mingham.
Chawner, Richard Croft ... The Abnalls, Lichfield.
Churchward, J. G. Admiralty-house, Dover.
Clark, Cyrus Street, near Glastonbury.
Clarke, I. P. King-street, Mills, Leicester.
Clayton, Nathaniel..... Stamp End Works, Lincoln.
Clements, Robt. George.... 98, Church-st., Shorehead, N.E.
Cosens, Fredk. Wm. 16, Water-lane, Tower-st., E.C.
Coulthurst, Wm. M. 59, Strand, W.C.
Cowie, Thos. S. 24, George-st., Hanover-sq., W.
Cremer, Wm. H., jun. { 210, Regent-street, W., & 10,
Bridge-st., Westm., S.W.
Deacon, Solomon..... { 59, Alma-street, New North-
road, Hoxton, N.
Docker, F. W. 24, Denbigh-st., Pimlico, S.W.
Elkington, Alfred { 22, Regent-street, Waterloo-
place, S.W.
Emanuel, Harry 21, Hanover-square, W.
Ernest, Henry..... 4, Whitehall, S.W.
Fetherstone, John Wm. Church-street, Longford.
Gaskell, John St. Nicholas-at-Wade, Margate.
Grant, Alexander 2, Clement's-st., Wood-st., E.C.
Gruneisen, Chas. Lewis.... 16, Surrey-street, Strand, W.C.
Hannington, C. S. North-street, Brighton
Harrison, Thos. E., C.E. 27, Great George-street, S.W.
Hartley, James Wear Glass Works, Sunderland
Heather, James { The Crescent, Camden-road-
villas, N.W.
Heymann, Lewis Stoney-street, Nottingham.
Holland, P. H. 36, Camden-square, N.W.
Horn, James 14, High-st., Whitechapel, E.

Isaacs, Saul 6, Thurloe-sq., Brompton, S.W.
Johnston, Rev. Jno. Brown. Glasgow.
Joyce, Rev. Jas. Gerald...Strathfieldsaye, Hants.
Kelly, Sir Fitzroy, M.P.... 32, Dover-street, W.
Kimpton, Thomas 6, Bath-st., Newgate-st., E.C.
King, John B. { 4, Gloucester-road, Kensing-
ton-gate, W.
Kinns, Samuel, Ph.D. Highbury New-park, N.
Landon, James { 88, Inverness-terrace, Bays-
water, W.
Lawson, Charles, Senr..... Edinburgh.
Lea, Charles Broad-street, Worcester.
Levinsohn, Lewis 7, Finsbury-square, E.C.
Lightly, William 123, Fenchurch-street, E.C.
Lockwood, Ben..... Huddersfield.
Maclea, Charles G. 17, Blenheim-terrace, Leeds.
Maw, George Benthall-hall, near Broseley.
Middleton, Capt. Sir G. } Shrubland-park, Ipswich.
N. Broke, Bart., C.B. }
Miles, W. P. Forest-hill, Kent, S.E.
Munn, Major W. A. { Throwley-house, near Faver-
sham.
Napier, Hon. William ... { 2, Old Palace-yard, West-
minster, S.W.
O'Hagan, John 81, Lombard-street, E.C.
Oldham, James, C. E. Austrian-chambers, Hull.
Payne, James { Canada-mills, Rotherhithe,
S.E.
Peake, Thomas { Brampton-lodge, near Stoke-
upon-Trent; and the Tiler-
ies, Tunstall, Staffordshire.
Potter, Edmund, F.R.S.... Dinting-lodge, Glossop.
Read, Reginald, M.D. { 1, Guildford-place, Russell-
square, W.C.
Reid, Hugo { Linden-cottage, Blackheath-
hill, S.E.
Richardson, Thomas { 20, New Bridge-street, New-
castle-on-Tyne.
Rigby, George 7, Park-lane, Piccadilly, W.
Robinson, James 7, Park-lane, Piccadilly, W.
Rule, Rev. W. H., D.D.... Aldershot.
Rutley, John Lewis { 5, Great Newport-street, Long
Acre, W.C.
Rylands, John New High-street, Manchester.
Sage, Frederick 11, Hatton-garden, E.C.
Shaw, Charles Henry.... 55, Charing-cross, S.W.
Sherriff, A. C. Shrubs-hill, Worcester.
Shuttleworth, Joseph..... Stamp End Works, Lincoln.
Simon, George..... 123, Fenchurch-street, E.C.
Smith, George Henry ... { 16, Queen's-chambers, Man-
chester.
Stanton, George Coton-hill, Shrewsbury.
Steevens, William { Agnes-villa, Godolphin-road,
New-rd, Hammersmith, W.
Storm, W. Montgomery } New York, U.S.
C.E.
Sullivan, Rt. Hon. Law- } Broom-house, Fulham, S.W.
rence
Telford, Charles Widmore, Bromley, Kent, S.E.
Thomas, Edwin, C.E. { 20, Wharf-street, City-road
Basin, E.C.
Thompson, Harry S., M.P. { Kirby-hall, York, and 7,
Mansfield-street, W.
Vickers, George Sheffield.
Vieweg, A. J. 82, Wood-street, E.C.
Virtue, James S. 294, City-road, E.C.
Welch, John K. 51, Berners-st., Oxford-st., W.
White, Bromley { 4, Princes-street, Bank, E.C.,
and 15, Percy-place, Clap-
ham-road, S.
Wilkinson, David { 2, Park-street, Higher Ard-
wick, Manchester.
Willet, John, C. E., 35, Albyn-place, Aberdeen.
Wood, John..... Thadden-grange, Alton, Hants.
Woollams, Henry { 110, High-street, near Man-
chester-square, W.

Wrigley, Francis..... { 16, Queen's-chambers, Man-
chester.
Zanzi, Alexander..... 30, Brompton-crescent, S.W.

The Paper read was—

ON ELECTRO-BLOCK PRINTING, ESPECIALLY
AS APPLIED TO ENLARGING OR REDUCING
ANY PRINTING SURFACE OR ORIGINAL
DRAWING.

By H. G. COLLINS.

In bringing before your notice, this evening, my inventions, commonly known as Collins' patents, and now being worked by the Electro-Printing Block Company—which, by the way, is a “misnomer,” for which I beg to apologize by stating, that in the formation of the company, these processes were found to embrace so many results, that actually the name to identify ourselves became a difficulty, and in an unhappy moment, and amongst a multitude of councillors, a most inappropriate name was selected, as you will readily perceive during the reading of this paper—it will be useless to occupy your time in discussing the advantages derivable from any means of producing or reproducing cheap illustrations, their necessity is universally acknowledged, and is becoming daily more and more apparent. Few books are now published entirely without them, and when we consider the charm that a narrative assumes when enlivened by a few touches of the artist, and how much more intelligible the description is rendered, we cannot wonder that the art of engraving, or rather of producing illustrations, should occupy such an important position among the arts of the present day. Illustrations possess, in many respects, a greater power of conveying knowledge to the mind than the most elaborate description in words. How could the beauties of nature and of art be described without their aid? Take them away, and what absurd notions should we possess of the appearance of every place we had not personally visited, and every tangible object which we had not seen, in fact, what would be our ideas of the world around us, and immediately out of our own sphere, if we had not the delineating powers of the artist to make its outward form and beauties apparent to our senses. It is somewhat difficult for us, who have all our lives been accustomed to their assistance in an educational point of view, to realize to ourselves what our ideas of things in general would be had we never looked upon an illustration. Take, for instance, a sunset in an eastern clime, perhaps one of the most magnificent sights with which Nature, even in the plenitude of her generosity, could enchant the eye of man; and I ask, would a closely-printed octavo volume give so correct an idea of what such a sight actually is, as a rough sketch drawn in a few minutes. The necessity for illustrations being conceded, it is the universal aim to render their production as cheap, as quick, and as perfect as possible; and any invention which claims to facilitate these objects, I am sure requires no apology for its introduction to the public.

My first patent, dated the 5th March, 1858, is, to use the words of the specification, for “An improved mode of obtaining impressions on an enlarged or diminished scale from engraved plates or other printing surfaces.” I will first describe the method of enlarging.

I take my subject, which may be a printing surface of any description, either a wood cut, a steel or copper-plate engraving, a stereotype or electrotype block, or a lithographic stone, and in fact any surface capable of giving off an impression; and then on a sheet of vulcanised india-rubber, covered with a composition possessing equal elasticity, and of a non porous character, I take the impression in transfer ink; if from stone, at the lithographic press; if from steel or copper-plate, at the copper-plate press, and if from surface-block or type, at the type press. I then punch small holes at equal distances (generally half an inch) round the rubber, into all of which I

insert hooks of the same size. I connect them, by means of four bars passed through the body of these hooks, and thus the sheet is ready for the expanding machine. This consists of two parts, the table and the screw. The table is composed of slate, perfectly even, and mathematically true; round it is a sort of raised shelf for the four bars before mentioned to rest upon, and divided into inches, half-inches, quarter inches, and eighths. I place the sheet of rubber, with the hooks and bars round it, square upon the frame, then take the screw, and after duly fixing it, I extend the rubber equally in all directions till it assumes the required size. I test the accuracy of the extension, from time to time during the operation, by measuring the distances between different marks printed on the sheet for that purpose when in an unextended state, and I adjust the tension until I find that the distances have all been increased in the same ratio. The impression on the rubber being thus enlarged, I transfer it to a prepared surface of stone or metal, which is then printed in the usual mode of litho or zincography. When the amount of extension required is greater than can be well obtained at one operation, which is generally limited to four times the area, it is only necessary to repeat the process.

For reducing—the operation is simply reversed. I extend the rubber first to the original size of the work to be reduced, then take the impression; after which I release the sheet from the tension, which then necessarily assumes its original dimensions; it is then put upon stone or metal, as before described, in the same manner as the enlarged subject, and printed in the usual way.

It is as well to mention that the indian-rubber, in order to extend equally, must be made of an uniform substance in every part, for the old axiom must here prove true, that the same thing, under the same circumstances, must always produce the same result; and it will be obvious that the slightest variation in this particular would materially detract from the perfection of the process; for if any portion should be thinner than the general character of the sheet, that portion must of necessity possess greater yielding power than the remainder, and thus produce an inequality, and a consequent error in its mathematical proportions, and although this slight difference might not signify for ordinary work, such as landscapes, or general illustrations, it would totally preclude the adoption of my invention for maps and plans, or any matter where accurate scales would be indispensable. This perfection in the rubber has not been obtained without great cost of anxiety, time, and money, as in my first steps I was not sufficiently acquainted with the wonderful mysteries of its nature, and consequently was unable to furnish the manufacturers with all the conditions required, the knowledge of which has only been obtained from pure experiment and closely calculated results; and I am happy to say that at length all these difficulties have, through the kindness and assistance of the various india-rubber Houses, especially Messrs. Silver, of Silvertown, been entirely surmounted.

With respect to the composition with which I coat the face of the sheet, I may mention, that without it the rubber would not give off the impression to the stone; in fact, the ink would be entirely absorbed; it is simply a transfer surface, involving the one necessary condition of equal tension with the rubber, or it would crack when extended, and destroy the picture. It is composed generally of flour, treacle, starch, white lead, and gelatine, and, when reduced to the consistency of cream, is applied with a brush, and allowed to become quite dry before being used.

Having thus described the nature of this, my first patent, and the manner of performing the same, I would have it understood, again to use the words of my specification, that I do not confine myself to the exact details described, but what I claim is, the taking an impression from an engraved plate or other printing surface on to a sheet of vulcanised india-rubber, and then,

either after stretching such sheet, or allowing it to contract, as the case may be, transferring from such sheet on to a lithographic stone or other suitable printing surface, from which a great number of impressions may be printed. Thus far and no further had I contemplated proceeding at the time of procuring this patent; but, although its value was great and self-evident, it was offered as a kind suggestion to me, by the well-known Mr. Mark Lemon, whether its usefulness would not be materially increased were I able to obtain the enlarged or reduced impressions on surface blocks to print at the type press. Producing them on stone, though a great achievement, was not all that could be wished; for where a great number of copies are required, as is the case in these days of beautifully-illustrated literature and pictorial newspapers, the expense and tediousness of working from lithography would in many cases be an insurmountable difficulty. After a series of experiments, I succeeded in this respect, and hence my patent, dated 2nd October, 1858.

Agreeably to my specification, this invention has for its object improvements in the production of blocks or surfaces to be used in printing. For these purposes, the drawing, device, or matter is obtained on a block or surface to be used in printing from a drawing, device, or matter on a lithographic stone or other surface, whether the same has been produced thereon by hand, transferred, or otherwise, by subjecting the drawing, device, or matter on the lithographic stone or other surface to a series of processes similar to that in which a lithographic stone is inked when about to be printed from in the ordinary way, but the ink or composition used is to be mixed with suitable driers, so that each succeeding coating of the composition may quickly dry or set before the next coating is applied. By these means the lines and parts constituting the drawing, device, or matter on the stone or other surface, which would be inked and printed from if used in the ordinary manner, become more and more built up or raised; and when such raising has been sufficiently accomplished, a cast in wax or other suitable material is taken, from which an electrotype is obtained, as is well understood.

I do not, however, confine myself to this method; much depends on the character and quality of the work. In many cases, after obtaining the transfer on stone or zinc, instead of building up the picture by successive rollings, I eat away the surrounding part by acid, taking care that the transfer is made in ink, that will resist the action of acid and the galvanic battery, or that it be rolled up with a varnish possessing the same qualities. For fine work this second method is much more satisfactory.

I have now placed before you, in as simple a manner as possible, the *modus operandi* of my process for enlarging and diminishing maps, plans, and engravings on to the stone and likewise for making surface blocks therefrom. In so doing, I have not occupied much time; indeed, the manipulation is so easy and devoid of all intricacies, when once practically understood, that it scarcely requires the length of a paper to give the necessary explanations respecting it. I must however tell you that from these two patents have sprung several valuable adjuncts. The first, and perhaps most important, is the production of electrotype blocks from the artist's original drawing, without the aid of the engraver. I simply require the artist to make his sketch on transfer paper in transfer ink, or, if he prefer it, in transfer ink upon a grained metal plate, and this, when delivered into my hands, I roll up with the acid-resisting composition, and then submit to the process before described for making surface blocks from the lithographic stone.

I have also succeeded in making transfers on to stone from most old prints and typography, which may be enlarged or reduced to any size, and made generally into electrotype blocks.

Photography and many other valuable processes in connection with the illustrative art are now engaging my attention, and I have no doubt that in a short time I shall

be able to produce an electrotype block from a photograph in the course of a few hours.

We will now, with your permission, turn our attention for a few moments to the commercial value of these inventions, for after all this perhaps is the most important consideration. Many marvels of ingenuity (which title for my inventions I by no means claim) have left their originator unrewarded on account of the very cleverness and ingenuity displayed in their construction. Were I able to produce a printing block from a mere thought, or by the touch of a magic wand, it would be commercially useless if it cost me £1 to do what could be effected by the old method of engraving for 10s. I however will apply the inventions to a few cases, and then leave the decision to your own impartial judgment.

1st. These processes are peculiarly applicable to publishers possessing a large plant in wood cuts and plates, which can be reduced or enlarged to any size required in a very short space of time, and at considerably less cost than the re-engraving of the same; hence, 4-to works may be made into 8-vo., or 12mo., and *vice versa*; from one set of plates of a Bible many sizes may be produced, saving the price of re-setting and the reading (in itself a very considerable item); a map publisher may, from one good set of plates, have every requirement supplied. By reducing them and erasing the names of all places of minor importance, an atlas can be produced for the lower forms; by increasing them, and inserting such places, an atlas will be ready to hand for the library or drawing-room; and, by extending them still further, wall maps of any size can be made.

It may here be as well to notice that the finer and more elaborate the work, the greater will be the advantage in point of price—for being a process totally independent of manual labour on individual lines, and all the parts of a picture being operated upon at the same moment of time, it is obvious that the charge cannot be regulated by the quality or intensity of the work. Thus, a block of four inches square, with simply a triangle thereon, would take as much labour to produce as the same area covered with the choicest work; and whereas to charge 5s. for the first, would not be cheaper than the engraving on wood, to charge 25s. for the second would perhaps not be a quarter the price.

I consider the process of making electrotype surface blocks from the artist's original drawing, will prove an immense advantage to publishers generally, and will do much to increase the number of illustrated books, newspapers, and periodicals. By its adoption a work can be enriched with the choicest productions, at the cost of comparatively a few shillings, and the shortness of time with which a series can be executed must be experienced and proved to be duly appreciated. In fact, illustrations, instead of, as formerly, forming a very serious item in the calculation of cost, will be looked upon in that particular as little more than the setting up of a page of type. I think I can see the time coming when our cheap literature, notwithstanding its rapid advance in point of character during the last few years, will assume a position in the world of letters which was never anticipated by its most enthusiastic admirers and advocates. As it is now with authorship, so it will be in the fine arts—a few years since we should never have anticipated, and could not have believed it possible for the pages of a 2d. or 3d. weekly periodical, or a shilling monthly serial, to be adorned with the writings of such bright luminaries as are not only not ashamed but proud to contribute to their pages; and however incredulous we may now be, I believe the period is not far distant when the artistic compositions which now appear only upon the shelves and walls of the rich will be equally possessed and appreciated by those less blessed with this world's goods.

Again, what increased facilities are hereby offered to proprietors of illustrated newspapers already existing, and to those who contemplate such speculations. I can confidently affirm that any number of cuts for such purposes

which would cost, by the old system of wood engraving, £100, can be equally as well produced by my method for (at a very moderate calculation) one-third that price. I would say to them, employ artists of first class talent, and however elaborate the execution of the subjects may be, the cost of making them into blocks for printing will be no more than that of the most common, coarse, and inartistic designs; and, further, the time consumed in the production is so trifling that a passing event can be presented to the public in an elaborate illustration in the course of a few hours.

I fully contemplate, from a series of experiments upon which I have been engaged the last few weeks, the shortly being able to take a photograph of any passing scene, and to make the same into a block, ready for press, within six or eight hours; thus affording to the public the opportunity of being supplied with what may be termed really a daily illustrated newspaper; and it would not be any presumption to say that, as in times gone by, Sir Robert Peel was handed a newspaper before he left the "House" containing the whole of his speech, which had taken him four hours to deliver, so we shall by this new aid be able to furnish an illustrated newspaper containing a faithful delineation of any grand or imposing ceremony that may have taken place during the day.

Another great advantage, which I cannot allow to pass without particular mention, is, that the electrotype blocks must of necessity be perfect *fac-similes* of the original sketches; that, being purely a chemical process, every line must be faithfully preserved; consequently the slightest touch, even a dot, cannot but be accurately represented; it is not a copy, but actually, truly, and in reality the artist's sketch itself transformed into a printing surface. This I conceive a very important consideration, for we are all well aware that a design, in going through the engraver's hands, is exceedingly liable to lose many of the fine touches and almost hidden beauties which so often appear in the productions of the eminent men of the present day, and which, although vividly perceptible to an appreciating eye, exist more on the paper as a thought than as a line. These, I repeat, are reproduced to a certainty by this process.

The transferring of old prints and typography I believe will prove of great utility, for by this any old and valuable work can be reproduced in *fac-simile*. Take, for instance, an original edition of Shakespeare, the type of which has long since been destroyed, and cannot be obtained at the present day without great cost and inconvenience; by simply supplying a copy of the book itself, its pages can be first transferred to stone, and then made into surface blocks at a very trifling expense. Old engravings, the plates of which are now no longer in existence, can be treated in precisely the same manner, and the gems of by-gone days, long since forgotten and hidden in the dust and obscurity of rolling years, can thus be resuscitated, for the gratification of a modern but not less admiring people. It is quite unnecessary, as it would be tedious, to traverse on this occasion the various fields open to this single arm of the process; but I see that its application can be made available to such numberless cases that to my mind the difficulty would appear rather where to commence. This, however, is more for the consideration of others than of myself, and I hope, as I believe, that it only requires a fair, true, and unvarnished statement of facts to set those thinking who have the power, the ability, the money, the time, and the will to turn to their own advantage—and, consequently, to the advantage of the public—any invention which has just claims on their consideration and attention.

For the purpose of illustrating advertisements and show-cards, labels, &c., these processes will doubtless prove of great advantage—the feature of pure identification with the subject of the advertisement being clearly established. Thus take the illustrated title of a book or publication, such as the *Cornhill Magazine* and Chambers's *Encyclopædia* (both of which were executed by my method), and en-

large them to one size for show-cards, and to a larger size for posters—thus the same design is reproduced in various dimensions and forms without the expense of re-engraving. I may mention that advertisers would do well to employ a superior class of talent for the original design, as the cost of perpetuating it will be no more than the reproduction of as unartistic a placard as ever appeared upon a wall; thus, if I mistake not, the character of illustrated advertisements will be entirely changed, and instead of the large unsightly bills, upon which we have hitherto been accustomed to gaze, we shall have the various new publications and articles of every description commended to our attention through the medium of the fine arts. I will not trespass upon your time in discussing at length the various channels open to the introduction of these processes generally, but I may mention that for all manufactures involving Art, Taste, or Design, such as pottery, lace, &c., they must necessarily prove of the utmost utility. A design for a dinner service can be reduced, enlarged, and altered in form for the various-sized dishes and plates, and the patterns for lace and other fabrics can be diversified in precisely the same way, as circumstances may require. The grand application, however, for which I consider these patents most peculiarly and eminently fitted—both on account of the immense saving of the public money they would effect, the comparatively short time in which all the work could be executed, and the perfect accuracy with which it would be accomplished—is the enlargement and reduction of the Ordnance survey, a work now going on, involving a large staff, and consequently an immense outlay, as it appears to me in reading Colonel James's report to the "House"; for he there states that he requires a sum of somewhere about three millions and a half, distributed over thirteen years, to meet the Government requirements, which I should be very happy to undertake to produce in about two years for one-third that sum.

DISCUSSION.

The CHAIRMAN said, an experience of nearly fifty years in drawing upon wood, might, perhaps, be supposed to have given him some acquaintance with the subject. He had often experienced the difficulty of getting his drawings faithfully rendered by wood-engravers, although in some instances they had been executed in the most beautiful style of art, by such accomplished artists as Thompson and Williams. He believed they had a vast number of talented wood-engravers, but there were none superior to the names he had mentioned. Still the production of first-rate wood-engravings was an expensive as well as a tedious operation. Feeling, therefore, that cheapness was desirable for the public advantage, he had made many attempts, and had lost some time and money in labouring to reproduce his drawings without the intervention of the wood-engraver, but hitherto he had not been able to accomplish his object. He was so satisfied with the process which had been brought before them that evening, that nothing but the excessive occupation of his time had prevented him from producing some work which might be reproduced in that way, but he hoped it would not be long before he did so. They might be satisfied that what was called surface-printing, which could be combined with letter-press, was of vast importance, as it afforded a large amount of information as well as amusement; and, moreover, formed a very important element in education. In the present day the number of highly educated people had much increased compared with what was the case in former times. If they looked at the earliest wood engravings, they found them to be of a very dark and dismal character; indeed, it was almost a matter of surprise that the minds of men in those days could have been satisfied with such inferior productions. In process of time, however, the art of wood engraving improved, but even then it had its disadvantages, for the wood blocks very rapidly wore out. Hence the process of stereotyping was intro-

duced, and answered very well for a time; but that was now, to some extent, superseded by the electrotype. If, however, Mr. Collins's process were such as he had described it—which he (the Chairman) saw no reason to doubt—they would find that good illustrations in cheap works would become much more general; and when they considered how many millions of human beings there were to be educated, they could hardly calculate the immense advantages which might be derived from this process.

Mr. LE KEUX wished to put a question with reference to the specimens of designs for pottery exhibited. At present he gathered that this process was adapted to surface printing, as well as to printing from plates, but as regarded pottery, he had always understood that the engraving for such purposes required to be cut very deep with a graver in order that there might be a sufficient body of ink to give the proper effect when exposed to heat. He begged to ask whether Mr. Collins could, by his process, produce surface blocks suitable for ceramic purposes. There could be no doubt as to his power of multiplying the designs, but he wished to know whether the process was directly applicable to pottery printing.

Mr. COLLINS replied that it was, but not by means of surface blocks. He had produced a surface block for the purpose, but he had not yet succeeded in producing a colour that would stand the firing. He could not obtain the colour of sufficient consistency to be available for surface printing, for a kind of wiping action took place in using surface blocks, which removed the body of the colour, and it would not then stand the heat of the fire. That was a matter to which his attention was at present directed. For pottery printing they were still limited to the incised lines, which he could produce by his process as well as by engraving.

Mr. LE KEUX asked whether Mr. Collins could get the deep line engraving.

Mr. COLLINS replied in the affirmative.

Mr. LE KEUX added that he should have been better pleased if more art and less mercantile feeling had been brought to bear upon this subject. As to reproducing old plates, printed in a stiff ink, which made the surface stand up, he did not think that could be done at present in a way to deceive collectors; but, supposing any step was made in that direction, he believed a finishing would be required, which could only be given by the hand of the artist.

The CHAIRMAN said it was not for a moment to be supposed that this process would supersede the manipulation of the artist, nor would it decrease the value of original works of art. These would always stand pre-eminent. A fine work of art was always an expensive affair to publish, and it required persons of property to become the purchasers of such works. But as the taste and intelligence of the people increased they would desire to possess those works of art themselves. Their means would not allow them to obtain the first impressions from the plate itself, but when the plate was done with, as far as the more wealthy class of people were concerned, they could bring them within the means of the second and third classes of society by the aid of this process. He thought a good work of art, once produced, should never be destroyed. He disapproved of the course of enhancing the value of an engraving by destroying the plate after a given number of impressions had been worked off. A good work of art was a great work, and a good engraving was, indeed, a wonder. He knew something about etching, though he could not engrave; but he was sufficiently acquainted with it to know that it was a task of immense difficulty; and when they looked at a good engraving, they beheld a wonderful work of art. If they could give the poorer classes a fair copy of such a work, they would be conferring on them a great boon. There were hundreds of thousands of square yards of bare walls in the cottages throughout the country, which ought to be covered with prints of some kind, and this process he believed would

be the means of giving the poor man copies of good works which he would never otherwise possess. In fact, they found that there was a rapidly growing taste in these matters. In travelling they found even the porters' rooms at the stations with prints from the cheap publications, and the walls of country cottages were similarly decorated. This showed an improved taste, and they could hardly estimate the good that such a process as this might effect.

Mr. MASTERMAN would be glad to be informed whether Mr. Collins's method was cheaper and more effectual than that of which he had read in the *American Photographic Journal*, and which he believed had been introduced into the Ordnance survey department at Southampton. It was a process called Photo-zincography. By producing a reduced or enlarged negative on glass, they could, by the aid of the sunlight, transfer it to zinc, from which they could produce reduced or enlarged copies of the Ordnance maps. He should like to know whether Mr. Collins's process was cheaper and more effectual than this method.

Mr. COLLINS was aware of the process alluded to, but he believed it would be found that the copies were not perfectly correct, inasmuch as there was an optical distortion in the camera, which prevented a right line being obtained. Besides this, he could by his process produce copies more rapidly than could be done with the camera. The operators with the camera were limited to sunshine or bright days, whereas the state of the atmosphere or the time of day had no effect upon his process, which could be employed at any time.

Mr. MASTERMAN was glad to find that an improvement had been made upon what he considered was already a great advantage.

Mr. GEORGE SMITH remarked that upon inspecting the electrotype plate of the map which had been handed round, it struck him that some of the lines were very deep and others comparatively shallow. Mr. Collins had stated that he produced the depth of line by repeated rollings, whereas, in his (Mr. Smith's) ignorance of the subject, it appeared to him that the rolling would be calculated to increase the depth of the lines all over the plate. In ordinary block-printing there were many parts in which the lines required to be much deeper than in others. He therefore could not understand how this was effected by the rolling.

Mr. COLLINS replied that if they kept to the rolling they could produce any depth of line they might require; but he had stated that where they had to deal with fine work he did not restrict himself to that mode; but he printed the picture with an acid-resisting ink, and then subjected the plate to the galvanic battery; and when they had the necessary depth of line for the ordinary printing, for the very broad lights they blocked up with wax before electrotyping. The latter operation was an easy one, which could be performed by a boy or a girl at a very small expense.

Mr. M. HANHART thought this process would be found highly useful, and without intending to throw any doubt upon the merit of the invention, he wished to inquire whether Mr. Collins was aware of the fact that many years ago there was laid before the Graphic Society a series of reduced or enlarged impressions similar to those now exhibited. There was a great deal of secrecy about the matter at the time, and he had heard nothing more on the subject. Then, with regard to the machinery used in this process, he recollects that in Class No. XXVI. of the Paris Exhibition in 1855, Messrs. Deviliers and Célérin exhibited a machine for enlarging and reducing designs for calico printing, called an Ecteno-cynographie. It did not, however, actually produce either plates or printing blocks. The machine was in appearance similar to a musical drum, with screws, by means of which a greater or less extension could be given to the india rubber stretched across it. The drawing was made with common lithographic ink or chalk.

Mr. COLLINS was not aware of the circumstance of such

impressions of plates as the last speaker described having been laid before the Graphic Society. Certainly they had not emanated from himself, and he did not think any patent had been taken out for the process, because all the authorities were carefully looked into before his patent was obtained. With reference to the last-mentioned machine, he was aware of its existence at the time, but that was for printing direct from the rubber, whereas his process was for producing enlarged or reduced designs on stone or printing blocks. In the former case only a solitary pattern was obtained, or, perhaps, by great energy two or three impressions might be taken off, but by his plan he could produce any number of copies required.

Mr. JONES inquired whether the extension of the india-rubber was uniform over the whole of the surface. If they stretched a piece of that material they found the extension greater about half-way between the forces, and that in the centre it grew thinner. He therefore concluded that the extension of the drawing would take place more in the centre of the india-rubber than at the sides. He would ask whether Mr. Collins had found the extension to take place uniformly throughout the whole substance, and if this were not the case, could he not use a piece of india-rubber so graduated in thickness as to produce perfect uniformity?

Mr. COLLINS would answer that question by stating facts. In order to test the uniformity, the india-rubber was printed in quarter-inch squares, from a plate accurately machine-ruled, and if they ran the compasses over it after the stretching, they would find it mathematically correct. He was willing to submit to a test of 800 lines to the inch at any part of the rubber, either at the centre or at the edges.

The CHAIRMAN said that with respect to the originality of Mr. Collins's process he would say this was not the first time experiments had been made in that direction. It was quite true that various attempts had been made, but with doubtful success. The powers of steam were known for many years before the mind of Watt rendered them available for the practical purposes of life. He believed all the efforts made prior to Mr. Collins's invention were more or less failures; and, therefore, to the man who had successfully solved the problem the real credit was due.

Dr. KINNS inquired whether the faintness noticeable in the copy exhibited of the print of "the Naughty Boy" was the result of accident in the printing, from not sufficient ink being used.

Mr. COLLINS replied it was merely in the printing, as anyone acquainted with that operation would at once see. After twenty or thirty impressions had been worked off the block would be in good order, and the impressions would be given with sufficient depth, and with the proper bearings of light and shade.

Mr. HOOD said, in the consideration of this subject, one difficulty had suggested itself to him; that was, that in a fine engraving, reduced to a very small scale, the fine lines would be apt to clog up and form a black ground. Had Mr. Collins any means of preventing that?

Mr. COLLINS said there was, of course, a limit, both to enlargement and reduction. Reduction might certainly be carried too far, and it was the same with enlargement. They might enlarge a subject till it became so coarse as to be offensive to the eye.

Mr. VARLEY regarded this process as a great advance upon an invention introduced to the Society many years ago. Long before vulcanised india-rubber was heard of, they had enlarged and reduced impressions, ordinary india-rubber being employed, but these had not the clearness and sharpness of line of those exhibited that evening, from the substance employed being less manageable. He considered any step in this direction was deserving of the highest encouragement.

Mr. RUTLEY, in reference to the photographs stated to be taken on stone or metal plates, wished to know how far Mr. Collins had been successful in producing impressions from them.

Mr. COLLINS called attention to a photograph taken on the previous day, which was not a very favourable one for photographic operations. That was a photograph on a glass negative, which was printed off on to the metal plate, from which the picture exhibited was obtained.

Dr. CAPLIN expressed a high opinion of the merits of this process. He thought that when certain good results were shown, it was unfair to ask why more was not done. This was, in his opinion, an unfair mode of dealing with any new invention or discovery. They should take it on its own merits, and not seek from it things which the inventor did not assert it was capable of producing.

Sir THOMAS PHILLIPS (Chairman of the Council) said, interesting as this discussion had been, he thought the time had arrived when it must be brought to a close, and the duty seemed naturally to devolve upon him to ask them to express their thanks to Mr. Collins for his paper. It seemed to him that the process was a very ingenious one, and great interest had evidently been excited by the manipulations of it, as shown that evening. The chairman, who was so well competent to judge of the merits of the invention, had told them it was one of great value, and that it was effectual for its objects; and although it might be true that certain portions of the process had been adopted before, with no great amount of success, Mr. Collins's merit was not the less, since he had, by his ingenious arrangements, rendered the invention really practical. This appeared the first really successful effort of the kind, and they must, therefore, award to Mr. Collins an expression of their sense of the value of his process. It had been said by one speaker that it would have been more satisfactory to some persons present, if the subject had dealt more with art, and less with the lower and more grovelling consideration of the interests of commerce. No doubt there were minds which would prefer to regard the subject from that point of view. It would be very gratifying if this invention contributed to the extension of art itself; but that would be asking from Mr. Collins that which he did not profess to do. In his (Sir Thos. Phillip's) judgment, it was a very great recommendation of the invention of Mr. Collins, that it provided for the multiplication of really accurate copies of works of art, at a price available for the masses. He thought, with their excellent chairman, that in an educational point of view, the invention was of great value. Pictures of the first class, which could only be possessed by the few, would, by the dissemination of cheap copies, now be the means of promoting elevated feelings and improved taste amongst the community at large. More works of art would thus be accessible to the great masses of the people, who had very little time to spare from their business occupations for the cultivation of their minds and their own self-improvement. It was of great importance that they should have the advantage of studying such objects of art as were calculated to improve and not to deteriorate their tastes. Therefore, he held this to be a valuable invention, as it enabled them to multiply, at a very small cost, those productions which now only afforded gratification to the higher classes of the community. He ventured, therefore, to ask the meeting to do what he was sure they would do heartily, namely, to express to the gentleman, who had conquered no common difficulties, the gratification they had felt at hearing from him the clear and lucid explanation of the process by which these results had been brought to pass.

The CHAIRMAN, in putting the motion, wished to state that he was at present engaged in etching a large plate, containing a multitude of figures. The prices of the proofs and prints would, of course, be such as were beyond the reach of the poorer classes of society; but he intended, as soon as these were gone, to have impressions taken by Mr. Collins's process, so that there might be an immense circulation at such a price as the poor man could afford to

give. He mentioned this, not as a notice of his own work, but to show that he thought so well of Mr. Collins's process as to contemplate its adoption.

—The vote of thanks was unanimously passed.

The paper was illustrated by a large number of specimens of enlarged and reduced prints, maps, &c., and the machine described was shown in operation.

The Secretary announced that on Wednesday evening next, the 12th inst., a paper, by Professor Leone Levi, "On Italian Commerce and Industries," would be read.

ARTISTIC COPYRIGHT.

A question of some importance to Art and public morals arises out of the growing practice of copying modern pictures in our Public Galleries. If any one will visit the South Kensington Museum on what is called a "Students' day," he will find the Galleries containing the Vernon and other gifts, crowded with men and women, copying the pictures of that collection. It is not as students that they are so employed, but simply as manufacturers. Some persons seem to assume a monopoly of the right of copying certain pictures, especially Landseer's; and so ostensible is the purpose for which these copies are made, that they have been seen marked for sale with the prices attached to them. These copies are sold to dealers who dispose of them in many cases to the ignorant as originals, or *replicas* by the artist; and thus the State is to a certain extent made the encourager of fraud. Such a result cannot be considered as a legitimate object of a Public Gallery, and the Trustees of the National Gallery ought, if possible, to take effective measures to prevent the practice. It cannot be defended as being of the slightest utility to the promotion of Art; on the contrary, it leads to consequences which are a serious damage to it. It may be doubtful whether permission should be granted to copy any modern pictures: certainly not within the lifetime of the artist, and not for a long period after his death. And even when a copy is permitted, the copyist might be prohibited from making more than one copy. There is more than one person who seems to get a living by copying Sir Joshua Reynolds's "Age of Innocence."

There are many interests concerned in a proper treatment of this question; the interests of Art itself, those of the artist, and those of the public,—besides what is the proper course for the Government.

LEEDS MECHANICS' INSTITUTION.

DISTRIBUTION OF PRIZES AND CERTIFICATES.

The *soirée* of the Leeds Mechanics' Institute and Literary Society, under the presidency of Lord Palmerston, took place on Friday, the 26th October, in the Victoria Hall. The hall presented a very brilliant appearance; its powers of accommodation were thoroughly exhausted, and half of the numerous audience were ladies. On the platform were Earl and Countess Fitzwilliam, Lady Palmerston, the Dowager Countess of Essex, the High Sheriff, the Marquis de Fonteville, the Right Hon. W. Cowper, Mr. and the Hon. Mrs. Denison, Sir P. and Lady Fairbairn, Sir J. Kay-Shuttleworth, Sir John and the Hon. Mrs. Ramsden, Admiral Meynell, Mr. Crossley, M.P.; Mr. Baines, M.P.; Mr. Titus Salt, M.P.; Mr. G. S. Beecroft, M.P.; and Mr. Monckton Milnes, M.P.

The SECRETARY of the Institution read the Report, from which it appears that by the operations of the Institute very nearly 5,000 persons are directly benefited. There are 1540 members and subscribers to the Institute. In the evening classes (adults) 149; 100 pay fortnightly, being in the receipt of weekly wages. Boys' and girls'

day-schools, 250. Pupils receiving instruction from the School of Art, 2,979—total 4,918. More than 800 out of the 1,549 members are persons who are in the receipt of weekly wages. The 2,979 pupils taught by the art masters, with the exception of about 200 pupils, are all children belonging strictly to the working classes. The members and subscribers to the Institution enjoy the use of a library of 11,600 volumes, the right to attend about thirty first-class lectures on subjects connected with literature, science, and arts, and a news-room where seventy-two of the leading periodicals and forty-two of the best London and provincial newspapers are taken in. All these advantages are enjoyed by the members for a subscription equivalent to from 1½d. to 3½d. per week. In the class department young men are offered instruction, at proportionably low rates, in chemistry, mathematics, grammar, French, and German. In the School of Art, instruction is given in mechanical drawing, modelling, drawing from the living models, and in free-hand drawing. All this important educational advantage is derived at a cost of less than £1,300 per year. Yet, great as are the advantages conferred by the Institute, the Committee feel that they are inadequate—that they do not sufficiently fulfil the proper objects for which Mechanics' Institutes were originally established, nor satisfy the demands of the age. While delighted to see the lecture-hall and the news-room crowded, they feel that it is to the classes that we must look for the more solid and permanent results of such an Institution. Unfortunately, the building at present possessed for the Institution is exceedingly deficient in proper class accommodation, it having been constructed originally as a music saloon. The Committee have resolved to appeal to the liberality of their fellow-towns-men, and gentlemen interested in the prosperity of the district, to aid them in erecting a building worthy of the town. They have provisionally secured a very eligible site of land, and, owing to the kind liberality of John Calverley, Esq., on very favourable terms. They have also obtained designs from several most eminent architects, which will be on view for a short time in the town-hall. It is intended that the accommodation shall comprise a reading-room and library; a lecture-hall capable of seating 2,000 persons; class accommodation for 800 pupils; a gallery of art eighty feet by thirty feet; a school of art for 300 pupils; and a school of science and chemical laboratory for 100 pupils. The estimated cost of the building is fixed at £16,000, which sum will, of course, include the price of the land. The total amount already received in aid of the New Building Fund is £5,000.

Lord PALMERSTON said he wished to express the high gratification and pride which he felt at having been allowed to preside at a meeting so numerous and so distinguished in one of the first towns of this great empire, and for a purpose so honourable to the town to which it related. In addressing an audience upon the subject of mechanics' institutions, it would be ungrateful and not becoming to forget those distinguished men who were the founders of this system of instruction—Dr. Birkbeck and Lord Brougham, names which were engraven in the grateful memories of all those who, in different parts of the United Kingdom, had derived benefit from these institutions. Of all the instruments for the diffusion of knowledge, there was none, perhaps, that excelled mechanics' institutions. Some objections, nevertheless, had been taken to them. People said that the working classes, for whose use these institutions were mainly intended, were too much occupied in daily toil to be able of an evening to bring their minds with the freshness requisite for improvement to study of any kind. That was a great and fundamental mistake. There was nothing more natural to the human mind and the human body than the combination of labour and study; and those men who had passed the greater part of the day in laborious employment found recreation and relief when in the evening hours they were able to enjoy the pleasures of literature, or to improve their minds by the acquisition of scientific knowledge. He was glad to see by the report

that this institution would have the means of imparting to its members learning of the most various kinds, adapted to all callings and fitting men for all employments. After speaking generally of the advantages that were afforded by the Library of the Institution, and the facilities thus given for the pursuits of Literature and Science, Lord Palmerston proceeded to speak of the great assistance afforded by lectures in the acquirement of knowledge. The lecturer was to the student what a good guide was to the man who for the first time entered a city or a country the geography of which he was unacquainted with, but who knew there were certain points which he wished to arrive at, and who, if left to his own unaided wanderings, might spend much time and much labour in arriving at the object of his pursuit. But the guide and the lecturer took the traveller and the student by the hand, led them by easy and pleasant ways to the ultimate object of their search, and placed them in possession of the end, and of that instruction which they were endeavouring to attain. There was however, one defect in lectures. The knowledge which a man acquired by his own unaided exertions, working it out by books, by experiment, and by reflection, remained fixed in his mind, because the trouble he had taken to acquire it implied deep attention to every stage of the process. They all knew that the memory was retentive in proportion to the degree of attention which had been paid to the object stored in it, and, therefore, although lectures did lead men easily to useful results which were usually only acquired by deep and intense study, still the student, at the end of a course of lectures, if he had not been interested in the subject by knowing that it bore upon his active pursuits, might carry away permanently but little of what he had heard. Then stepped in that principle of recent establishment, but of most valuable effect—the Examinations. Then came the examiner—to whom the student voluntarily submitted himself, knowing that if he obtained a good certificate upon examination, it would be a proof of ability and attainment which would be useful to him in his calling, and this led to really earnest and persevering study. Thus the three sources of instruction—the lectures given in general, the subsequent study carried on by the individual, and the test put to him by the examiner—completed a system of instruction which, if pursued, as no doubt it would be pursued, not only in that town but in other parts of the country, must tend rapidly to improve the intellectual condition of the people of the United Kingdom, and by improving their intellectual condition must add to their happiness, and promote the greatness and prosperity of the empire to which they belonged.

The noble lord then proceeded with the distribution of the prizes and certificates awarded by the successful candidates in the examinations of the Society of Arts, addressing a few words of encouragement to each as he handed him the reward. In the same way he delivered the prizes and certificates obtained under the Oxford middle class examination, as well as those won by the boys of the school attached to the Leeds Mechanics' Institution, under the middle class examination conducted by the University of Durham.

The SECRETARY then read a list of the subscriptions, including £50 from Lord Palmerston, £500 from Mr. William Beckett, Mr. James Brown, M.P., £250, and many other contributions of a similar amount. The total of the sums announced was £5,005.

Sir JAMES KAY-SHUTTLEWORTH, Bart., moved the first resolution, as follows:—"That the extension of science and art instruction among the middle and industrious classes is one of the most effective methods of raising the social position of the people."

This was seconded by the Right Hon. W. Cowper, who said he looked on mechanics' institutes as a system of elaborate machinery by which persons brought under its influence might be raised in the social scale, made more useful in their lives, and altogether rendered more worthy

of the calling which they had embraced. The great work of the present day was to popularise adult education as we had popularised the education of children, and it was because these mechanics' institutes were admirable means to that end that they ought to receive support and assistance like that of which the present meeting was so noble an example.

The resolution was carried unanimously.

Mr. EDWARD BAINES, M.P., proposed the next resolution:—"That while the Leeds Mechanics' Institution and Literary Society has conferred considerable benefit upon the town and neighbourhood by its library, school of arts, classes, lectures, &c., it has been unable fully to carry out the important educational objects for which it was originally established, from the want of adequate accommodation." He said that during the thirty-five years that institution had existed he had known many of the advantages which it had conferred on individuals and upon the town generally; but the accommodation provided had been miserably inadequate. They had now but one good room, which had to do duty as library, reading-room, and lecture-hall. The classes were wretchedly accommodated. It had been shown by experience in Manchester and elsewhere that as better accommodation was provided the number of members had increased; but here they had positively retrograded, from a want of proper conveniences. He said most confidently that there was no reason why the Leeds Institute should not have 3,000 members instead of 1,500. He believed that Manchester, which had recently built a noble hall for its Mechanics' Institution, had gained at least double the previous number of members when the accommodation was made adequate. It was the duty of Leeds to make its institution a model for all the Institutes comprising the Yorkshire Union—instead of 150 members in the evening classes, they might get 800, as Huddersfield had done; and as there was no natural limit to the success of such an institution, they ought to set themselves vigorously to do the great work which undoubtedly stood before them.

Sir JOHN RAMSDEN seconded the resolution, which was carried.

Mr. G. S. BEECROFT, M.P., then proposed the following resolution:—"That this meeting has heard with pleasure the proposal to erect a new building for the Leeds Mechanics' Institution and Literary Society, which will provide accommodation for all its present departments, and include schools of art worthy of the town. Further, the meeting pledges itself to render all possible aid to the subscription now making for the purpose."

This was seconded by Mr. CROSSLEY, M.P., and carried. The Mayor of Leeds having taken the chair,

Mr. WILLIAM BECKETT proposed the thanks of the meeting to Lord Palmerston, for presiding. The noble lord's visit could not fail to raise the institution in public estimation, and he assured his lordship his visit to Leeds would long be retained in their grateful recollection.

The Rev. Dr. ATILAY (Vicar of Leeds) in seconding the vote of thanks, referred to the circumstance that his father, when at Cambridge, at the commencement of the present century, served under his lordship, who was then a captain in the gallant volunteers of that day. This showed that at that period his lordship was as willing to devote himself to the welfare of the country as he had proved himself ever since.

The vote of thanks was passed with much enthusiasm. Lord PALMERSTON having acknowledged the compliment,

On the motion of Sir PETER FAIRBAIRN, seconded by the Rev. ALFRED BARBY, the thanks of the meeting were given to the visitors.

The resolution was acknowledged by Earl FITZWILLIAM and Mr. MONCKTON MILNES, M.P.

The proceedings then terminated.

Home Correspondence.

MR. BUCKLAND'S PAPER ON THE ACCLIMATIZATION OF ANIMALS.

SIR.—The comprehensiveness of the subject so ably introduced by Mr. Buckland, renders it difficult to do more than offer hints and suggestions in corroboration of the views advanced by him. Although the subject was partially ventilated by a number of useful remarks from various speakers, yet there is still a wide field ungarnered. It was cast upon England, as somewhat of a reproach, that France had been before her several years in this systematic acclimatization question. But, besides the reasons advanced for this by Professor Owen, one cause for this zeal on the part of France is to be found in the great dearth of animal food in that country as compared with the United Kingdom. The average consumption of meat per head in that empire, some fifteen or twenty years ago, was calculated to be only about 26lbs.; and although, since the free opening of the butchery-trade, the proportion is now somewhat larger, yet, as compared with the consumption of our own well-fed population, it is lamentably deficient. M. St. Hilaire, the President of the Paris Acclimatization Society, is the well-known advocate of hippophagy, which has been called in as an adventitious aid to the restricted supply of animal food. One great cause of the deficient supply of meat in France is—the extensive and early slaughter of calves, which the farmers are too poor to keep till they attain a mature age, another the small weight of the stock slaughtered, and the general consumption of cow-beef. That there are abundance of wild animals available for food in many countries, and which are so used by large numbers of people, is well known, as I had occasion to show in a little work which I published a few months ago on "The Curiosities of Food." But whether many of these viands would be acceptable to the English palate is another question. That very many of the wild animals, so abundant in different quarters, could be transferred to some of our colonies and utilised, I fully believe, even if, as was urged, we have not room or necessity for them here. The American bison is met with in immense droves on the prairies, and there are still countless millions of them traversing the length and breadth of great parts of the American Continent. I doubt whether the domesticated horned cattle of the United States equal the numbers, while they must fall considerably short in weight, of these wild ones. How useful might some of these prove if carried to our Colonies for their flesh, and for their dressed skins—the well-known "buffalo robes."

Take, again, the European and American elk; these are usually considered by naturalists specifically identical. It is probable, however, that they are distinct. The flesh, whether fresh or dried, is excellent, and tastes like beef, while the tongue and nose are regarded as great delicacies. This elk has been domesticated with great success in Maryland, Virginia, Washington, New York, and other States; and if they have thus succeeded, why could they not be introduced to Newfoundland, and many other of our colonies, where there is abundance of waste land? The moose is being transferred in America to parts of the northern States, and the buffalo to other districts. Then there is another useful beast worth notice. I mean the yak, of Asia, to which even the Americans are turning their attention. It would be suited to some elevated regions. It is a useful beast of burden, strong, surefooted, and capable of carrying a load of 150 lb. to 200 lb., while it produces abundance of rich milk, and it may be purchased in some of the hill regions for 24s. to 30s. The soft fur and hair are made into useful fabrics, and into tents and ropes, while the bushy tail has always been held in estimation by the higher classes for chowries or fly flappers, and as an emblem of authority. There is also the joobul, a mule or cross between the yak and the hill breed of

cattle, which is more hardy, will carry a load of 100 lb. to 150 lb., and can be purchased for £2 or £3.

As regards wool-bearing animals, the success of the alpaca was pretty fully borne out by the observations made by Mr. Ledger. The discouragements and difficulties incurred by those concerned in its introduction were not at all greater than attended the first propagation of the Australian flocks. In the year 1801, about twelve years after the first convict settlers landed, New South Wales had 7,000 sheep.

Sydney Smith, in the *Edinburgh Review*, in 1803, sketches, in a comic vein, the probability of Botany Bay turning out a second North America, and declaring its independence of the mother country on account of a tax on kangaroo skins; and he goes on to remark, that "the Government of the colony has begun to turn its attention to the coarsest and most necessary species of manufactures, for which their wool appears to be extremely well adapted." Little did that eminent wit imagine, when he penned his half-ironical description of the resources of the new colony, that, in the course of half a century, New South Wales would possess a world-wide celebrity for the production of wool of the finest quality; that, besides stocking half-a-dozen neighbouring colonies with sheep of a noble breed, she would possess within her own limits upwards of eight millions of the same, and export wool to the value of a million and a half yearly.

There is no reason why, with the great variety of herbage produced in Australia, and its adaptation as shown to the growth of the alpaca, it should not have a large amount of produce of this kind without decreasing the proportionate quantity of wool. I find a calculation made in the Sydney papers of the probable growth of the alpaca flocks in 50 years—a long time in the life of a man, a short period in the history of a people.

Commencing in 1861 with 280 animals, of which 220 are females, and making deductions of a liberal nature, according to the present ratio of increase there would be, in fifty years, 9,760,000 head, the wool of which (an average of 7lb.) at 2s. per lb., would amount to the sum of £6,832,000 per annum. Then there are the wool-bearing goats, which are receiving attention, some having been introduced into the Cape Colony and South Australia; while in the United States, the Cashmere goat has been acclimatized in Georgia, South Carolina, Virginia, and New York.

With respect to small sheep, as alluded to by Mr. Buckland, I may call attention to a letter from Mr. Moorcroft, cited in the late Dr. Royle's work on the "Productive Resources of India," wherein he states that he had "purchased and made arrangements for the keep of upwards of a hundred head of a race of sheep, the smallest perhaps known, but which in in fineness of fleece may vie with the Merino, under the advantage of a much harder constitution and of a better carcase."

It was stated by Mr. Crawford that it had hitherto been found quite impossible to domesticate any other member of the equine race than the horse. Now this is scarcely correct. Some of the quaggas have been and can be tamed if attention is given to the subject.

Although the zebra is untameably vicious, there are two other species of quagga which have been broken to the saddle and to harness. They are docile and easily tamed, and during the governorship of Sir Lowry Cole, an Englishman drove a team of eight or ten into Cape Town, and sold them to the highest bidder. Those sent to Lord Derby were also, I believe, broken to the saddle.

In Southern Africa there are numerous troops of these quaggas, and they are moreover not subject to that destructive epidemic the horse sickness.

The introduction of new edible species of fish to different quarters, opens of itself a very wide field for experiment. Carp and chubb have already been introduced into Tasmania, as well as into the Cape Colony, and in view of the premium offered by the French for a new freshwater fish for the waters of Algeria, might not the Gourami

(*Oosphromanus olfax*), which has already been carried to Java, Mauritius, Cayenne, Martinique, and other quarters, and is spoken of as a delicious fish, prove the one suited for the purpose.

Among the *fauna* of Madagascar which it might be desirable to introduce into Australia, if practicable, is a bird whose mission appears to be that of destroying an insect which is a great nuisance in many colonies. Mr. Ellis made the acquaintance of this beneficent bird under the following circumstances :—

"Passing herds of cattle, either feeding or reclining on the grassy plains, I had noticed that they were always accompanied by a number of birds about the size of a pigeon, but in shape more like a stork, having long legs and neck. These birds seemed to be the constant companions of the cattle, attracted by the flies or other insects about the oxen, and passing in and out amongst, and even upon them, when grazing or lying down, with the most perfect freedom and confidence. On inquiring of the natives about them, I was told that they were called *vorompotsy*, white bird ; or *voronts' anombe*, literally, birds beloved by cattle, as they always followed the herds, and devoured the flies which tormented them. The number of birds was also proportioned to that of the cattle ; if the latter were but few, they would be attended by only two or three birds ; but, if the herd was large, there would be a great number of birds in companies amongst them."

Will none of those enterprising individuals who compass sea and land to supply us with canaries and Java sparrows, pay a visit to Madagascar, and bring us a few families of "vorompotsy," and add to the obligation they will confer upon the colonies, by making some experiments with a view to the domestication of so useful a bird ? That man would deserve well of his country who should be instrumental in diminishing the plague of flies, and Mr. Ellis indicates that this is not altogether impracticable.

I can scarcely expect to occupy more space in the columns of the *Journal* at present, although the subject is a most fertile one, and one which, in several papers read before the Society, I have not failed to advert to.

I am, &c.,
P. L. SIMMONDS.

8, Winchester-street, S.W., Nov. 29, 1860.

SIR,—Of a surety Mr. Crawford is heterodox anent the matter of venison. He decries all except the fallow deer of England, the favourite food of Robin Hood, which was by no means the stall-fed, muttonfied, bastard venison which passes under that name in the "categorie of victuables" orthodox amongst aldermen. Red deer, Mr. Crawford acknowledges, is high-flavoured, but is only good when treated with mutton fat in lack of fat of its own.

In hot countries deer do not grow fat, it is true, but for all that, in a hot summer on the Pampas of La Plata, fallow deer venison was and is incomparably better food than bull or cow, or horse or ass, or mule or pig, or puma or ostrich, aye, or guanaco or mulito—a species of the armadillo—and I have eaten of them all without bread, salt, or vegetable, and that is the true way to test the qualities of meat. Guanaco and vicuna are next to the deer, and they are no fatter for the most part.

When Mr. Crawford next lights upon deer or antelope, let it be "brittled" in the following fashion :—Take out the four muscles in and outside the spine, from head to tail in long strips, analogous to the "saddle" in mutton and the "lumbar" cut in beef. Put these strips, without fat, to soak in lemon juice for twenty-four hours, then oil them all over with the best olive oil, tie them up in a roll, roast them, and baste them continually with oil. Make gravy from the bones. If Mr. Crawford and all his friends dissent from that roast when they have proved it, why, then, let them turn it over to Mr. Buckland and me. I maintain that venison well used is the king of all flesh food, and will breed better brains in a man's scull than all the beef and mutton hitherto invented, and will breed fewer disorders in his body. It was the deer, no doubt, that imparted its raciness to Robin Hood and his merry men. I

entertain a profound respect for venison pasty and Burghundy, as well as for pork pie and Port, but the pasty was clearly only a contrivance to make the venison portable, and lemons and olive oil must have been scarce in the greenwood in Robin Hood's time, wherefore was so much lusty rejoicing when the foresters lighted on a "hart of grease."

And not to venison only does the lemon and olive oil roast apply, but also to beef and mutton. Cut away the fat both bovine and ovine remorselessly, and treat the lean with the lemon and the olive, and few men there be who would not thenceforward consider it "savoury meat such as their souls loved." I do not mean that fat meat is not better than lean, but that it is the muscle without the fat that builds up health and strength. Roast meat, without bones, which latter should be used up to make strong gravy for the roast. But let Mr. Buckland go on and increase our stock of venison, by all means in his power, and, Mr. Crawford notwithstanding, it would be a marvellous good food to feed our volunteers on, making them all veritable Robin Hood's men. "Dry," indeed ! why what is dryer than a potato ? But don't we go to the cow and get fat second-hand to cure the dryness ? And what would turkey be without the pork fat ? The best food without good cookery is nothing worth. Once upon a time, a bumpkin poacher, wishing to seduce a bumpkin non-poacher, called on him with a present of a hare, warm from the slaughter, telling him to cook that, and see whether it was not a nice dinner to be had for nothing. A week after he called again on Hodge to inquire how he liked the dinner. " Didn't loike hit at all," exclaimed the recipient. " Well, man, how did e cook him ? " " Why, biled'n with turmuts, to be sure." *Exit hare-giver.*

Mr. Crawford's error was of the same kind. The fresh-killed deer in India had no time to season, and it was wasted, like the visitor's appetite at an alderman's feast, on a leg of mutton. If Mr. Crawford be tried by a jury of venison-eaters they will bring in a verdict that his evidence is "not proven." It is upon a par with that of the man who, in the lowest depth of ignorance, "biled a fresh hare with turmuts."

The Quiriquinchis, *i.e.*, the armadillo tribe, produces in the Pampas one variety, called in country nomenclature the mulito. It is in form and colour very similar to what we call the woodlouse, but about twelve inches in length, burrows in the ground, and runs quick, digs rapidly, like our mole, and gets out of sight. It is good sport to ride after them in the grass of the open plains, and knock them down with a whip. This animal bears frost as well as sun, feeds cleanly, and would probably thrive in England as well as hedgehogs and guineapigs. For eating it is delicious, far more so than sucking-pig, certainly than Pampas sucking-pig, whose favourite suction is dead horse ; beyond all doubt the favourite food of pigs' choice, when wild on plains the porcine savage runs.

The following is an extract from the traveller's Journal :—" Fine morning, saw a mulito in grass ; gave chase, knocked him over with sword ; twelve inches long, shape like woodlouse ; carried him four leagues, tied to saddle by one leg ; disembowelled, put him on his back, in hot embers of horse dung, covered him over, half an hour done. Belly skin came off like crackling, back shell capital kind of tureen. Two of us ate it up, and wished for another. Didn't we hunt them after that first taste. * * * Know now why Moses prohibited pork in Judaea. Fell in with drove of some 400 swine—savage beasts—looked at three of us, as to say, ' You let us alone, and we'll let you alone.' Horses gave superiority over numbers, and horse-pistols decidedly more effective than tusks ; so skirted the drove, or should say herd, for they wouldn't drive at all, while their leaders, charged with the foam over their tusks—grunting furiously—kept horses just a-head, and raked them over stern. Dropped some forty in their tracks—selected three—a full-sized boar, a young boar, and a small

pig ; put a lazo each round necks, and dragged away, two leagues, to camp. On arrival, sides of pigs worn through to bone. Cut in half—put down to roast. When done—knives out, and meat into mouths, which only closed once. Mouths opened and ejected unsavoury morsels—shouts of laughter from waggones, who watched the green—uns, enjoying surprise. Train-oil certainly not nice, but much preferable to Pampa pig. Mem.—Not to eat pig in strange places again."

As the Americans say, that was "a caution." Yet this same pig, caught and kept from all food but maize, which he will sulk at for three weeks till his ribs look thin enough—this same pig, after six or eight months' rations of maize, becomes good practicable pork. But Heaven help the passengers in an ocean craft, whose skipper has provided them with preserved, fresh, or salted pork from the Pampas direct. It has been said that "all flesh is grass;" but Pampa pig is guiltless of grass, and is only dead horse at second hand—flesh—but flesh "fishified" with a flavour of dead whale, possibly acceptable in Esquimaux land, but quite unbearable where the climate is sultry.

It is humiliating thus to dwell on the process of burying dead animals in our stomachs, but it must go on till the chemists shall teach us how to endow a quartern loaf of bread at pleasure with the separate qualities of fish, flesh, fowl, and fruit. Bread is the "staff of life," and contains all the elementary principles; but without change of flavour it palls on the appetite. Whence shall come the aromas? Had Charles Mansfield lived, he would probably have worked out the problem, and then indeed the proverb might have a truth "all flesh is grass," wheat being only a grass with its germinal parts exaggerated.

I am, &c.,
COSMOS.

SIR,—Last evening so many able speakers occupied the allotted hours of the meeting that the few impromptu remarks which occurred to me at the time, and which were expressed after the members broke up, I now put into writing, at the earnest suggestion of a member who was anxious to obtain information concerning the breeding of oysters.

My practical experience can be told in a few words:—

On the east bank of the Hudson River, twenty miles from the city of New York, might be seen every April and May a number of small boats dredging for oysters, at about a stone's throw from the shore. The size thus obtained would average two inches in diameter. These were then taken to a place twenty miles lower down, and at ebb tide planted in beds, where they remained till autumn, when they were again collected for market, having during the intervening four months quadrupled their size and become rich and luscious in flavour. I have seen as many as thirty boats at a time thus dredging, yet each succeeding spring would find a renewal equal to the exhaustion of the previous season; in fact, the fishermen assured me that the increase was mainly owing to their "stirring them up." As my property extended at this point for about a quarter of a mile on the river, and as I had owned it for more than twenty years, my information is derived from a long experience.

The flavour of the young oyster was something like "English natives," but after the transplanting into more genial waters, and when they were brought to market, they possessed such deliciousness of flavour as to command the highest market value. A few transferred to this country would doubtless prove a most desirable benefit.

I was asked by another gentleman if they would be suitable for the Cape of Good Hope.—I think not; but those found in Florida would, for at the latter place the seasons are hot, like those at the Cape. In the lagoons and estuaries of Florida, billions on billions are met with, of the finest kinds, and of the most delicious flavour—white and round and marrow-like, but they are of a dif-

ferent form to the northern oyster, being very oblong; I have a bunch of them by me.

To give an idea of the immense quantities of these bivalves in the peninsula of the Gulf of Mexico, I have but to state that the rivers and lagoons, at very short intervals, for hundreds of miles, are planted with oyster-shell mounds, some of which are not less than 500 yards long, ten high, and fifty broad. In fact the only high ground to be seen in this region—to use an Hibernicism—is composed entirely of oyster shells.

A fisherman of St. Augustine informed me that this fish did not live more than two years, and that it obtained nearly its entire size the first year, but after the spawn had attached itself to its home, the shell formed very rapidly.

Here is a theme for a long article, but I cannot spare time to write more at present. These few lines, however, are written to show myself a willing co-worker in the objects the Society aims at making useful.

I am, &c.,
GEORGE HARVEY.

16, Rathbone-place, W., Nov. 29, 1860.

SIR,—I regret the learned professor in the chair found it necessary to close the discussion on Mr. Buckland's interesting paper on the acclimatisation of animals, ere the question so frequently put by him, Why have we not this animal? Why have we not that animal? had met with a responsive—Because Agricultural balance-sheets and railway audits are such practical annoyances to the most ardent scientific theory. Let Mr. Buckland show the value per acre of land any member of the deer family would yield, even if their race were endowed with the most aldermanic tendency to obesity.

The purely Welsh sheep ranges over vast tracts of land for a sufficiency of food, and his descendants upon removal, are not to be domesticated or hedged up in fields in one generation. What value per acre does his family yield?

Acclimatisation, as far as this island is concerned, presents few difficulties with any animals it is desirable to introduce. Profitable domestication has many. Man in this island appears to have been busily engaged in extinguishing many races of animals to make room for himself and those friendly animals which yield a high rent for the land by the commercial value of their products during the interim period of propagation.

The horse, by its labour; the cow, by the dairy; the sheep, by its wool, &c.; and equally profitable attributes must be shown in any animals sought for future domestication. I am not of those who think there is nothing left to be done, nor yet entirely thankless for the experience and industry of those who preceded us, but from the latter half of the paper (which I had only the pleasure of listening to) and the discussion that followed, I believe the question of profit and utilisation was not sufficiently dwelt upon to prevent disappointments and profitless if not mischievous introductions in the search for novelty.

I am, &c.,
HENRY WEBBER.
1, Brewer-street, Golden-square, Nov. 29, 1860.

SIR,—Having had considerable experience on the subject of your correspondent's (*Cosmos*) letter in the last *Journal*, I beg of you to let him know that the practice he would recommend is unfortunately too well known, both in this country and on the Continent, to require any further inquiries by scientific men. I say "unfortunately," as I know from experience that meat and fish deodorized by the process now so well known, produce most acute disease. Meat once putrid, and treated in this way, cannot be sold without the purchaser knowing it, therefore it must be disguised in some way; and when used as sausages, &c., must be mixed with other meats to prevent its being nauseous.

Putrid fish can only be effectually deodorized in cooking. Flat fish, such as turbot, sole, and skate, are the best; the fat of round fish, like the salmon, and the green fat of turtle, turn to a rancid oil, like that from the blubber of the whale, although the flesh is made perfectly sweet. Thus it is with the skate which the English fisherman sells to the French one, and whose transport from Boulogne to Paris, if not marked by a stream of phosphoric light, is sufficiently known by its odour to those who travel in the same train. Fish and meat, once putrid, when cooked separate from the bone, and all the gelatinous parts dissolve in the water; and it is quite impossible to make a firm, stiff jelly from either, however strong it may be made. The gluten, in the process of the putrid fermentation which has taken place, seems to have undergone some chemical change which I do not understand, but which, when it is cooked, leaves the fibrine by itself, tasteless, and without nourishment; being tasteless, by an experienced "artiste" it is soon rendered palatable; hence, "Turbot en vol-au-vent," or "au gratin," "Raie au beurre noir," "Sole en matelote," &c. The appearance of the meat when cooked is similar to badly-prepared meat, in hermetically sealed cannisters, and it is therefore only good in pies, stuffing, and where the flavour is masked by a thick sauce. When roasted it never produces that beautiful crust known as *osmazone*, and one is required to be produced on it by "basting and dredging," but nothing will give it back its true flavour. Rotten cheese may be deprived both of smell and flavour, but it is impossible to bring it back to its solidity. The unwholesomeness of fish, veal, pork, and other white meats that have been putrid, when partaken of by children and dyspeptic persons, I can vouch for; the agony they produce resembles that from some known poisons, and, with all the remedies at hand, it lasts some time. Pepsine I find the best to allay this irritation of the mucus membrane of the stomach. I have made it a practice for some years to try upon myself and my youngest children the effects of various diets, and I would advise your correspondent "Cosmos" to do the same, and try the diseased meat he speaks about; but not to let the persons he tries it upon know what it is, for the imagination has a great effect upon the stomach.

It is quite true that we have not come to the end of our food chemistry; and I should like to know from some of your able correspondents what would be the effect upon the human system of partaking of a meal of beef that had been poisoned from eating laurel. Within these few days I saw in the neighbourhood of London three Welsh heifers drop down dead on the road from that cause. They were immediately stuck in the throat by a passer-by, and they bled. They were then sent up to Whitechapel-market to be dressed and sold. I was curious enough to go and see them, and, to all appearance, the meat was good. Is such meat or fish destroyed by poison unwholesome?

I trust that we may succeed in the acclimatisation of animals for the purposes of food, and that we may shortly have in our bills of fare the eight-banded armadillo boiled and stuffed, with cream sauce; but I hope we may never lower ourselves in the scale of human nature to the level of the Esquimaux, by eating diseased flesh and putrid blubber.

I am, &c.,

G. WARRINER,
Instructor in Cookery to the Army.

BREAKWATERS.

SIR.—The discussion upon this subject has been prolonged for years, and has been before the Institution of Civil Engineers, without the smallest prospect of being brought to a satisfactory conclusion.

The cause of this anomalous state of things is, that all the engineers, inventors, and patentees who have devoted their talents and energies to this matter, have totally lost sight of nature, and would seem to be only intent upon devising works solely to benefit contractors, by

the enormity of constructive workmanship they endeavour to introduce into their respective schemes.

In order to proceed to the construction of a breakwater that will effectually resist the force of the Atlantic Ocean, when urged to the utmost fury on our coasts by storms and hurricanes, we have only to lay down a series of rocks in the proposed line, each rock being alone sufficient to resist immovably the shock of the heaviest breakers. Let them be 50 or 100 tons each, no matter what may be the size of block required, because with larger interstices a less amount of tonnage of stone will need to be deposited, and so render the work less costly.

The actual minimum magnitude of the rocks required to resist the force of the sea may be readily ascertained by the examination of any exposed rocky coast, where the smallest loose rock that remains unmoved will represent the desired maximum size; and let it be here observed that there can be no possible objection to the above-mentioned large interstices, because the sea will either close them up with sand and wreck, or it will not. In the first case the work will become solid, and in the second it is well known that no rough water can pass through that would inconvenience the smallest open boat. Also, that the nature of the bottom is not of the slightest importance, for our only work will be to pitch down rocks on the course of the proposed line until they rise above the highest known water-mark.

As under this system of forming breakwaters all lesser rocks and stones must be rigidly excluded, a self-evident objection arises, which has been personally laid before me by the contractors for such works.

The contractors say, that in quarrying such large blocks a considerable quantity of small stones and rubble must inevitably be produced, and if they were not allowed to deposit the said rubbish in the breakwater they would be unable to charge for this waste. The answer is clear—that this is *their* business, and a breakwater is not to cost the nation four or five times the amount necessarily required, wholly and solely for the benefit of the contractor. Besides, if contracts were so worded as to exclude their rubbish, the contractors would speedily find the means of quarrying large blocks with a small amount of inferior stuff, the whole of which would have some market value for other purposes, the contractor's object, however, being to get rid of it at breakwater prices.

CHERBOURG.

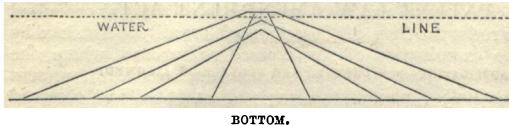
A series of attempts were made during the last century, and continued at intervals ever since, to construct a breakwater in this harbour, without success, owing to the unfortunate infatuation of the French engineers, who imagined that the hulk of an old ship, or even a framed caisson, filled with rubble stone of all sorts, would resist the effects of the ocean in a storm. In consequence, this noble roadstead has been permanently injured by the dispersion of enormous quantities of rubble all over the harbour. When twenty or thirty large caissons went to pieces in the first storm, the engineers laid down twenty or thirty more, and so on until the harbour and roadstead are now nearly ruined. The forts and batteries since built on the ruins of the piles of rubbish spread abroad by the action of the sea, are cracked in all directions, and the damage is now almost irreparable.

PLYMOUTH.

The breakwater in this Sound was commenced many years ago, under the auspices of the late Messrs. Rennie and Walker. In this case, also, a very large portion of small stone—which in a work of such magnitude may well be called rubble, was deposited together with some of a larger size, the smaller being under one-quarter of a hundred, and the largest about twelve tons. This at the bottom and near the centre of the mound, where it can be of no possible use. In consequence of the smallness of the larger blocks, and the immense quantity of rubble mixed up with them, under the false notion of producing a solid structure, the first great storm overthrew the estimated

section of the breakwater, which was represented by a nearly equilateral triangle, and converted it into an obtuse isosceles triangle, with the crest as much, or more, below the water line as it was previously above. Of course an enormous addition of rubble was then required to bring the crest to its former position. Successive storms produced the same effects, and still larger additions of rubble to make the work up. The following simple lines will show the various sections of the breakwater at different stages of the construction:—

SECTIONS OF THE PLYMOUTH BREAKWATER.



Many difficulties were met with in finishing this work, for every high tide, accompanied with southerly gales, constantly threw the top courses of rubble over into the Sound. In order to prevent this damage, the whole of the breakwater from below low-water mark had to be flagged with immense slabs of stone, cemented and cramped with iron and lead.

All these disasters would have been avoided by the use of large rocks alone, which can be readily obtained at the Oreston Quarries, of one hundred or one thousand tons each if required, and the cost of the breakwater to the nation reduced perhaps one-half, and more than half the time of construction saved.

ISLE OF PORTLAND.

The cost of the breakwater now in course of construction in this roadstead has been increased to an incredible amount by all the ingenuity of modern science. There are no large blocks in this structure capable alone of resisting even a moderate storm, and all the rubbish of the quarries has been shot into and upon the body of the work, in order, as the officials tell you, to make solid work, whereas the smaller stones only act as rollers, which in any commotion will considerably help the knocking about of the larger blocks.

The whole of the materials are run out in wheeled trucks upon a perfect screw pile timber jetty, standing in six fathom water, of the most scientific and costly description, the simple plan followed by railway navigators being rejected as far too economical for the contractor's views of engineering.

In railway tips, the materials are run out on a rail or tram laid upon the back of so much of the work as may be complete at the time.

Very few of the blocks exceed the weight of three or four tons, while the poor quarrymen, with their own rude and simple appliances, have often moved out of their way and shot down the cliff blocks of useless "roach," of from four to eight hundred tons computed weight in one solid mass, a fact that puts an end at once to all supposed difficulties in moving such large masses of rock, especially in this case, where the breakwater springs from the land, and the quarries are at a high level above. No wheel trucks would have been required, and no return rail or tram on the back of the work.

Besides all these arrangements, which appear almost like expedients for unnaturally increasing the cost of this breakwater, a wide opening in the middle has been devised, ostensibly for the purpose of allowing fishing boats to come into Weymouth Roads without having to stretch round the extreme end of the breakwater. This opening, requiring two piers of solid masonry, will, of course, allow heavy seas to roll into the roadstead; but it has offered an opportunity for a brilliant display of scientific construction, as well as a vast increase to the cost of the undertaking, as the whole of the two piers is built with squared masonry under the diving bell, in six fathoms

water, and, generally speaking, in a rough sea, so that the works have several times been carried away, and many lives lost.

As a naval rendezvous the Portland roadstead will, in my opinion, be nearly useless in time of war, as the enemy passing by, out of range, can count every mast, and ascertain thereby the exact amount of force therein concealed.

I am, &c.,
HENRY REVELEY.
Poole, Nov. 12.

Proceedings of Institutions.

FAVERSHAM MUTUAL IMPROVEMENT SOCIETY.—The sixth annual meeting of this Institution was held in the Public Rooms, Faversham, on Wednesday evening, Sept. 12th. The President (Mr. F. W. Monk) occupied the chair, and after some introductory remarks, called upon the Secretary to read the report for the year 1859-60, from which it appeared that the number of members had increased during the year from 360 to 487, and would shortly exceed 500. Nearly £40 had been expended upon the library, and the circulation of books had very considerably increased. Amongst the works added to the library were copies of "M'Clintoch's Voyage of the *Fox*," "Arago's Astronomy," "Buckland's Geology," "Tennyson's Idylls of the King," "Russell's Diary in India," "Humboldt's Life Book and Travels," "Strickland's Queens of England," and "Humboldt's Cosmos." The thanks of the society were due to Giles Hilton, Esq., for a valuable present of books. The last lecture season had been a great success; the lectures were good; the average attendance large; and, although the price charged for admission was very small, yet a profit of between four and five pounds had been realised by the course. The annual soirée held in February last was attended by a large number of members and their friends, and the results in all respects were satisfactory. It had tended to unite the members in one common cause—the cultivation of social friendship and the furtherance of intellectual advancement; and it had in no way infringed on the ordinary funds of the society, as the amount realised by the sale of the tickets more than covered the cost of the entertainment. The attendance at the ordinary meetings had not been large, owing mainly to the inconvenience of the society's room. At those meetings the following lectures and readings had been given:—Mr. Webb, of Eynsford, on "The Reformation"; Mr. Monk, on "Geography"; Mr. Kirby, on "Great Painters"; Mr. Boorman, on "The Pitcairn Islanders"; Mr. Johnson, "A Reading from Shakespeare"; Mr. Monk, "A Reading on Lord Macaulay." For the coming season the course of lectures was as follows:—Mr. Barnett Blake, of Leeds, on "The Philosophy of the Breakfast Table"; Mr. Henry Vincent, on "Home Life, its duties and its pleasures"; Mrs. Balfour, on "Charlotte Bronte"; Mr. Wheeler, on "The Planets and their Attendants"; Mr. Gerald Massey, on "Robert Burns"; Mr. William Parsons, on "Old Homer and his days"; Dr. Letheby, on "Ancient and Modern Alchemy"; the Rev. E. Paxton Hood, on "Kings Crowned and Uncrowned"; Dr. Lankester, on "The Sea-shore, its products and its Lessons." A new feature in the Society's operations was the offer of prizes to stimulate a spirit of laudable emulation in the production of works of literature or art. The following prizes had been offered:—A guinea edition of "Keith Johnston's Atlas of General Geography," for the best, (and if the competitors number ten, a twelve and sixpenny edition of the same work for the second best) "Map of England and Wales;" also a guinea edition of "Longfellow's Poems," for the best (and, if the competitors number ten, a half-guinea edition of the same work for the second best) "Essay on Recreation." Up to the present time, ten mem-

bers have given their names as competitors in the construction of the maps. A special fund had been formed by shilling subscriptions for the purchase of the rewards. It had been arranged to hold the ordinary meetings monthly in the Public Rooms, and the time was to be occupied by the production of the report of the society's proceedings, discussion upon the affairs of the Institution, and readings and conversation upon the writings of great men, as Shakespeare, Longfellow, Lord Macaulay, and others. The financial statement showed that the receipts had amounted to £129 6s. 11 $\frac{3}{4}$ d., the expenditure to £126 2s. 0 $\frac{3}{4}$ d., leaving a balance in the hands of the Treasurer of £3 4s. 11d. After the adoption of the report, the election of officers took place. Mr. F. W. Monk was re-elected president.

MARYLEBONE LITERARY INSTITUTE.—Sir F. H. Gold smid, M.P., as President of this Institution, opened the lecture season of 1860 on Monday evening, the 15th Oct., with a lecture on "The Public Health, and the means of promoting it." The lecture was given in the theatre of the Institute, in which a very full audience had congregated to hear the hon. member. The lecturer opened his subject by remarking upon the difficulty of ascertaining, from any reliable data, the measures adopted in other countries and other times than our own, or their results. There could, however, he said, be no doubt that in all countries public health was largely influenced by food, drink, dress, cleanliness, pure air, and wholesome recreation. He attributed the prohibition of the use of certain animals as food by the law of Moses entirely to sanitary conditions, and observed that when modern custom differed from the Mosaic law in this respect, as in the case of swine, medical science proved that in warm climates especially the use of swine's flesh was injurious to health. The directions in Leviticus as to purifying and cleanliness were likewise based upon sanitary principles. Turning to the Romans, he called attention to the great care, as proved by the remains of their aqueducts and sewers, taken by them to provide their city with pure water and thorough drainage. He next spoke of the progress of sanitary improvements in our own country, and its effect in lessening the rates of mortality—drew a comparison of the healthiness of England with France and Prussia, showing that for want of due attention to sanitary principles in the most healthy of the Prussian cities, the proportion of deaths to the population was higher than in the most unhealthy towns in this country; dwelt upon the importance of making sanitary knowledge an element in our system of school education; and suggested that in girls' schools cooking and housework should be likewise taught. He spoke of the model lodging houses and the improved mode of building labourers' cottages, as calculated to promote health, and suggested that to check the evil consequences to the public health arising from the continued rush of the population from the rural districts to the great towns, it would be desirable to erect dwellings for the working classes a few miles out upon the lines of railway, which might be let at such a rent as would leave room for the payment of transit between the home and the place of work. After some practical suggestions and comments the hon. member wound up by urging the importance, in an economical point of view, of paying increased attention to the subject of sanitary reform. A vote of thanks to the lecturer was unanimously accorded, which the hon. member acknowledged by stating how gratified he was at having the opportunity of serving the Institution.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Geographical, 8 $\frac{1}{2}$.
Medical, 8 $\frac{1}{2}$. Clinical Discussion.

TUES. ...Syro-Egyptian, 7 $\frac{1}{2}$.
Civil Engineers, 8. Renewed discussion "On Submarine Telegraph Cables."
Medical and Chirurg., 8 $\frac{1}{2}$.
Zoological, 9.

WED.	...Literary Fund, 3.
	Society of Arts, 8. Prof. Leone Levi, "On Italian Commerce and Industries."
	Graphic, 8.
	Microscopical, 8.
	Archæological Assoc., 8 $\frac{1}{2}$.
THURS.	Roy. Soc. Club, 6.
	Philological, 8.
	Royal, 8 $\frac{1}{2}$.
	Antiquaries, 8 $\frac{1}{2}$.
FRI.Astronomical, 8.
SAT.	...Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From *Gazette*, November 30th, 1860.]

Dated 17th October, 1860.

2524. W. Ramsell, 218, Evelyn street, Deptford, Kent—Imp. in the manufacture of boiler plates, also applicable generally for the resistance of steam, or internal pressure, and in the apparatus or machinery employed therein.

Dated 29th October, 1860.

2648. W. Clark, 53, Chancery-lane—Imp. in railway brake apparatus. (A com.)

Dated 1st November, 1860.

2670. M. A. J. Dahmen, Peckham—Protecting ships and other vessels, buildings, works of construction, and other bodies.

Dated 3rd November, 1860.

2691. J. H. M. V. Hinsbergh, Breda, Holland—Cleaning and preparing pig's wool, so as to give it the elasticity of horse-hair and the flexibility of wool for bedding, etc.

2694. J. Armour, Perceton Fire Clay Works, Kilmarnock, N.B.—Imp. in dies employed in the manufacture of sewage pipes, chimney linings, and other hollow bodies of clay.

2696. W. White and J. Parly, Great Marylebone-street, Middlesex—Imp. in colouring or obtaining the effect of colouring, and other ornamentalations, to surfaces in relief, or partly in relief.

Dated 6th November, 1860.

2714. W. Green, New Bond-street—Imp. in fire-arms breech-loading.

2718. T. W. Rammell, 6, Victoria-street, Westminster—Imp. in centrifugal discs revolving in air, water, and other fluids, and in the application of motive power by such discs.

1730. G. Wilson, York—An improved construction of stoppered bottle.

Dated 8th November, 1860.

2746. J. Cutts, Liverpool—Imp. in apparatus for ascertaining or indicating the number of persons that may pass through or over any particular place, applicable to omnibuses and other vehicles, theatres, ferries, gardens, baths, and other places.

2750. W. F. Henson, New Cavendish-street, Portland-place—Certain improved fabrics made entirely or partially of alpaca or mohair.

Dated 9th November, 1860.

2760. J. W. Wallis, Fenchurch-street—Imp. in book indexes.

2762. D. B. Lewis, Cheltenham—Imp. apparatus for propelling steam vessels.

Dated 10th November, 1860.

2764. W. C. Forster, Gibson-street, Lambeth—An improved method of manufacturing soluble silicate of potash.

2766. T. B. Daft, 2, Queen-square, Westminster, and W. Pole, 3, Story's-gate, Westminster—Imp. in the fish joints of railways.

2768. E. B. Wilson, Parliament-street, Westminster—Imp. in the manufacture of railway wheels, tyres, axles, and points and crossings, which improvements are also applicable to the manufacture of ordnance, tubes, and metal cylinders generally.

Dated 12th November, 1860.

2770. F. Walton, Haughton Dale, near Manchester—Imp. in insulating telegraphic conductors.

Dated 13th November, 1860.

2774. D. Thomson, Grosvenor-road, Pimlico—Certain imp. in rotary pumps for raising water and other liquids.

2776. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imps. in the motive mechanism of cabinet organs, and other cylinder musical instruments of that class.

2778. M. A. F. Mennons, 39, Rue de l'Eccluse, Paris—Certain imps. in the construction of organ pipes. (A com.)
 2780. A. V. Newton, 66, Chancery-lane—An improved construction of feathering paddle-wheel. (A com.)
 2782. T. Hughes, Wolverhampton—An imp. in spittoons.

Dated 14th November, 1860.

2788. R. W. Waithman, Bentham, Yorkshire, and J. Waithman, Manchester—Imp. in the manufacture of cords, twines, and similar articles, and in the machinery or apparatus employed therein.
 2790. F. E. Sharp, 2, Gloucester-terrace, Blackheath—An improved portable rifle battery. (A com.)
 2792. J. S. Crosland, Johnson Brooke, near Hyde, Chester—Certain imp. in steam engines.
 2794. R. H. Gratrix, Salop—Imp. in obtaining colouring matters for dyeing and printing. (Partly a com.)
 2796. J. A. Bruce, Llanmington, and G. H. Cottam, Old St. Pancras-road—Imp. in hay racks.

Dated 15th November, 1860.

2798. J. Schofield, Oldham, and M. Schofield, of the same place—Certain imp. in machinery or apparatus for doubling yarns of cotton or other fibrous materials.
 2799. J. Matthews, Burton-upon-Trent, Staffordshire—Imp. in brewing.
 2801. P. Unwin, J. Unwin, and J. U. Askham, 121, Rockingham-Sheffield—A saloon barrel pistol knife.
 2802. G. Bagshaw, Preston—An improved arrangement of the flues of steam boilers for consuming smoke.
 2804. W. H. Ralston, Keele, Staffordshire—Imp. in the manufacture of soda ash.
 2805. G. R. B. Amott, Queen-street, Ross, Herefordshire—An improved plough, with mortise chisel, and plough iron combined.
 2806. A. V. Newton, 66, Chancery-lane—Imp. in sewing machines. (A com.)
 2807. R. B. Broome, 166, Fleet-street—An imp. in the manufacture and in the welding of steel and wrought and cast iron. (A com.)
 2808. R. A. Broome, 166, Fleet-street—Imp. in sword bayonets and other swords. (A com.)
 2809. J. Ridley, Stagshaw, Northumberland—An improved method of effecting the combustion of fuel, and of products arising therefrom.

Dated 16th November, 1860.

2811. C. Stevens, 1b, Welbeck-street, Cavendish-square—Imp. in sheet-iron tiles. (A com.)
 1813. C. W. Williams, Liverpool—Imp. in steam boilers for increasing the evaporative effect thereof, applicable also to stoves and other like vessels or apparatus,
 2815. J. Stockley, Newcastle-on-Tyne—Imp. in apparatus for grinding, smoothing, and polishing plate glass.
 2817. E. B. Wilson, Parliament-street, Westminster—Imp. in the manufacture of railway wheels, and other articles of cast steel or malleable cast iron.
 1821. R. A. Broome, 166, Fleet-street—Imp. in joining or connecting together pipes and tubes. (A com.)
 2822. W. H. Woodhouse, Parliament-street—An improved method of, and instrument for, measuring distances.
 2823. W. L. Thomas, Southsea, and Colonel H. P. de Bathe, Scots Fusilier Guards—Imp. in the construction of plates or shields for the purpose of resisting shot and other projectiles.
 2824. M. L. J. Lavater, Guildford-street, York-road, Lambeth—Imp. in portable or syphon filters.
 2825. M. A. J. Dahmen, Park-road, New Peckham—Imp. in treating vegetable fibrous substances in the manufacture of paper.
 2826. G. Glover, 8, Queen-square—Imp. in apparatus used in measuring gas.
 2827. A. Morrison, Nottingham—Imp. in locks.

Dated 17th November, 1860.

2829. B. Blackburne, York-buildings, Adelphi, and H. Carr, Victoria-street, Westminster—Imp. in axle boxes.
 2833. B. Barrett, St. Giles-road, Norwich—Imp. in the treatment of natural and artificial stone, and in the manufacture or production of artificial stone.

Dated 19th November, 1860.

2837. O. Vandemburgh, New York—Imp. in projectiles to be used in guns and ordnance, and improvements in the appliances for their projection.
 2839. W. Butlin, Northampton—Imp. in machinery or apparatus for stamping and ramming, to be chiefly applied to and used for the purpose of paving.

Date 20th November, 1860.

2841. T. T. Macneil, Mount Pleasant, Dundalk—Improved means of obtaining adhesion on railways for ascending inclines, and other purposes.
 2843. J. Hamilton, jun., Liverpool—Imp. in tubular wrought iron telegraph posts.

2845. A. V. Newton, 66, Chancery-lane—An imp. in the construction of spring hinges. (A com.)

Dated 21st November, 1860.

2847. J. Marland, Ivy Cottage, Hunslett, Leeds—Imp. in warping and sizing yarn and thread.
 2849. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of boots and shoes, and of a new material to be employed therein, which material is applicable to various other useful purposes. (A com.)
 2351. H. Dearden, Rochdale—Imp. in machinery or apparatus for punching washers, for giving the necessary drag or friction to the spindles and bobbins of spinning machinery and similar purposes, and also in the method of using or working the said washers.
 2853. W. Cooke, Charing-cross—Imp. in ventilating.
 2855. W. Cope, W. G. Ward, and E. Cope, New Basford, near Nottingham—Imp. in lace machinery.
 2857. C. Myring, Walsall, Staffordshire—Imp. in the manufacture of covered harness furniture, buckles, slides, and other similar articles, and in the machinery or apparatus to be employed in such manufacture.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Dated 22nd November, 1860

2858. S. A. Varley, 7, York-place, Kentish Town, and C. F. Varley, 4, Fortress-terrace, Kentish Town—Imp. in the regulation of heat, parts of the invention being applicable to other purposes.

PATENTS SEALED.

[From Gazette, December 4th, 1860.]

December 4th.	
1372. J. Matson.	1428. V. de Tivoli.
1373. C. Senior.	1440. C. Loewenstein.
1378. A. J. P. de Carvalho.	1444. G. Firmin and C. Firmin.
1382. G. Hadfield.	1459. G. Davis.
1385. E. T. Hughes.	1461. J. West.
1386. F. H. Wenham.	1474. H. Widnell.
1386. C. Hadfield and W. A. Atkins.	1475. E. Stone.
1392. P. Hooley and J. Wood.	1579. G. C. Morgan.
1393. J. Saunders and J. Piper.	1580. G. C. Morgan.
1396. T. W. Miller.	1613. W. Skinner.
1397. P. Vangeenberg.	1822. E. Dugdale.
1402. E. J. Hughes.	2013. J. Campbell.
1407. G. J. Cookson.	2046. G. Kershaw.
1408. G. A. Waller.	2232. T. Greenwood.
1412. A. A. Croll.	2307. J. Campbell.
1413. G. Mackenzie.	2318. E. B. B. Barker.
1820. J. Westwood.	2322. J. H. Johnson.
1423. C. Brreeze.	2443. W. Hood.
	2457. G. Bonelli.
	2461. T. Barnett.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, November 30th, 1860.]

November 27th.	November 28th.
2970. J. Nichols.	2975. R. A. Broome.

[From Gazette, December 4th, 1860.]

November 29th.	
2976. D. K. Clark.	3009. J. Rubery.
	3023. F. O. Ward.
	December 21st.
2989. J. Eccles.	1987. E. C. Shepard.
2994. J. Fowler, jun., and W. Worby.	2997. J. Livesey.
	3000. R. Hazard.
2996. A. Parkes and H. Parkes	3001. E. Slack.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, November 30th, 1860.]

November 20th.

2778. A. E. L. Beilford.

[From Gazette, December 4th, 1860.]

December 1st.

2800. J. Reilly.